

## The Changing Landscape of Hospital Capacity in Large Cities and Suburbs: Implications for the Safety Net in Metropolitan America

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**ABSTRACT** *An analysis of trends in hospital use and capacity by ownership status and community poverty levels for large urban and suburban areas was undertaken to examine changes that may have important implications for the future of the hospital safety net in large metropolitan areas. Using data on general acute care hospitals located in the 100 largest cities and their suburbs for the years 1996, 1999, and 2002, we examined a number of measures of use and capacity, including staffed beds, admissions, outpatient and emergency department visits, trauma centers, and positron emission tomography scanners. Over the 6-year period, the number of for-profit, nonprofit, and public hospitals declined in both cities and suburbs, with public hospitals showing the largest percentage of decreases. By 2002, for-profit hospitals were responsible for more Medicaid admissions than public hospitals for the 100 largest cities combined. Public hospitals, however, maintained the longest Medicaid average length of stay. The proportion of urban hospital resources located in high poverty cities was slightly higher than the proportion of urban population living in high poverty cities. However, the results demonstrate for the first time, a highly disproportionate share of hospital resources and use among suburbs with a low poverty rate compared to suburbs with a high poverty rate. High poverty communities represented the greatest proportion of suburban population in 2000 but had the smallest proportion of hospital use and specialty care capacity, whereas the opposite was true of low poverty suburbs. The results raise questions about the effects of the expanding role of private hospitals as safety net providers, and have implications for poor residents in high poverty suburban areas, and for urban safety net hospitals that care for poor suburban residents in surrounding communities.*

**KEYWORDS** *Medicaid ALOS, Poverty, Safety net hospitals, Suburban hospital care, Urban hospital care.*

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### INTRODUCTION

The 100 largest U.S. cities and their surrounding suburbs are home to more than half the nation's population.<sup>1</sup> Among the greatest challenges for both urban and suburban communities today is the growing difficulty hospitals face meeting the needs of poor and uninsured residents while surviving economically in an ever-competitive health care environment.<sup>2</sup> At the same time, federal, state, and local

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governments are reassessing their financial commitments to safety net facilities as political pressure mounts to contain or reduce costs associated with Medicaid and charity care.

These market forces and government actions are creating significant shifts in the composition of the safety net in large metropolitan areas across the country. Research has documented a decline in the number of general acute care hospitals across these areas since at least 1980.<sup>3</sup> As core components of the safety net, public hospitals have been part of this trend, declining 14% in the 100 largest cities and 43% in their surrounding suburbs between 1980 and 1996. The decline in public hospitals, whether through closure or conversion, has raised concerns about the increasing role of the private sector in providing care to the poor and uninsured. In areas where public hospitals have been privatized, evidence indicates that care for the uninsured declines.<sup>4</sup> And because major urban safety net hospitals are more likely to provide critical, high cost, and frequently unprofitable specialty care, such as neonatal intensive care, and are more likely to care for uninsured and difficult to treat patients, the closure or conversion of these facilities may, by implication, reduce access significantly.<sup>5</sup>

### **Concerns About Urban–Suburban Hospital Disparities**

A small but growing literature has focused on urban–suburban hospital “disparities.” The Community Tracking Survey (CTS) has found a widening disparity in high quality care found at the community level in Indianapolis, Seattle, Phoenix, Greenville, Northern New Jersey, and Miami, in which physician specialists and hospital systems are disproportionately investing resources in wealthier suburban communities.<sup>6</sup> A recent CTS case study of Northern New Jersey hospitals found that the largest hospital systems are “competing aggressively for market share in wealthy suburban areas” that are experiencing population growth, by expanding and upgrading facilities, whereas smaller hospitals serving lower income and aging urban communities with stagnant or declining populations are struggling, with several closing in recent years.<sup>7</sup> Our research from an unpublished pilot study in 2003 found that relatively poor suburban areas that are home to increasing numbers of diverse and immigrant populations, such as in suburban Los Angeles, are struggling with inadequate access to hospital care, particularly regarding a lack of emergency and specialty care, made worse by the dispersion of populations and services across a large geographic area.

The Agency for Health Care Research (AHRQ), in noting the often distinctive differences in demographics and population density between central cities and their surrounding suburbs, has emphasized the importance of assessing the differences between the needs and problems of safety nets in urban and suburban areas.<sup>8</sup> However, little research has systematically examined and compared urban and suburban trends in hospital availability, capacity, and utilization across large metropolitan areas.

This study analyzes indicators of hospital use and availability for urban and suburban areas by focusing on two key dimensions: hospital ownership status and the poverty level of the area where a hospital is located. First, we describe hospital characteristics and volume of care by ownership status across cities and suburbs for 1996, 1999, and 2002. Secondly, we examine select measures of hospital use and capacity of cities and suburbs by poverty level, which is positively correlated with illness and health care need.<sup>9</sup> From these results, we consider how the delivery of hospital care may be changing in urban and suburban areas, particularly for

vulnerable populations, and the potential implications for the hospital safety net in large metropolitan areas.

## METHODS

The Social and Health Landscape of Urban and Suburban America project, from which this study originated, documented the social and health improvements and challenges occurring in the nation's 100 largest cities and their suburbs between 1990 and 2000.\* The selection of the 100 largest cities for both 1990 and 2000 was based on population counts from the 2000 Census.<sup>10</sup> Although there is no standard method for defining a suburban area, the counties are the federal government's standard building blocks for defining a metropolitan statistical area (MSA).<sup>11</sup> We define the suburbs as the counties making up a primary MSA, excluding the central city(ies). Over time, as traditionally "suburban" cities have grown relatively rapidly in recent years, many now appear on the list of 100 largest cities. Aurora, in the Denver MSA and Plano, Garland, and Irving in the Dallas MSA are examples. In these cases where more than one of the 100 largest cities are part of the same MSA, the combined city data from that MSA were subtracted to define the suburban area. Thus, the sampling represents 100 cities in 82 distinct metropolitan areas.

This method of selection from the 100 largest cities produces a different set of cities and suburbs than a selection based on the 100 largest metropolitan areas. Our method may somewhat lessen the differences found between city and suburban averages compared to a method that selects the largest metropolitan areas first and subtracts the "traditional" central city to define the suburban area.

We report 1996, 1999, and 2002 hospital data provided by Health Forum from the American Hospital Association (AHA) annual surveys for general acute care hospitals located in the metropolitan areas of the 100 largest cities. The nonresponse rate was about 18% for all 3 years. At least one hospital from each city participated in the survey each year. Eight suburban areas had no hospital data included in the study.

We examined hospital data by three categories of ownership: public, nonprofit, and for-profit, as reported by each institution. The hospital indicators included number of hospitals, staffed beds, admissions, inpatient days, outpatient and emergency department (ED) visits, Medicaid discharges, and Medicaid average length of stay (ALOS). These data were grouped and analyzed by urban and suburban location, as described above.

To examine the relationship between hospital capacity or utilization with poverty, we categorized cities and suburbs each into three poverty groups and compared their relative distribution of hospital services with their relative distribution of population. Population size itself is not a perfect indicator of demand because people can use hospitals in places where they do not live. However, we note that other research has found that 75% of discharges among acute care urban hospitals took place within a 10-mile radius.<sup>12</sup> Because hospital utilization data were not available by patient address, we aggregated population and hospital

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\*Reports and statistics for individual cities and suburban areas are available at [www.downstate.edu/healthdata](http://www.downstate.edu/healthdata). This report series was the successor to an earlier grant from Robert Wood Johnson Foundation to examine health and socio-economic trends of the nation's 100 largest cities, from 1980 to 1990.

resource and utilization data across all cities and across all suburbs. This allowed us to make relative comparisons by poverty levels that minimize the effects of variation of individual locations.

We defined levels of low, medium, and high poverty to create similarly sized groups of cities and suburbs, based on poverty data from the 2000 Census.<sup>13</sup> Levels were created separately for cities and suburbs because of the large difference in average poverty rates (17.4% for cities, 9.3% for suburbs). For cities, low was defined as less than 15%, medium as 15 to 20%, and high as greater than 20%. For suburbs, low was defined as less than 7%, medium as 7 to 10%, and high as greater than 10%. We calculated the percentage of total urban population that each poverty group of cities comprises and the percentage of total suburban population that each poverty group of suburbs comprises.

We aggregated the following hospital indicators, using 2002 data, by urban and suburban poverty groups: staffed beds, admissions, inpatient days, outpatient and ED visits, number of level 1 or 2 trauma centers, number of positron emission tomography (PET) scanners, and number of neonatal intensive care unit (NICU) beds. To analyze the relative availability or use of hospital resources by poverty level for each indicator listed above, we compared each urban poverty group's percentage of the total to each poverty group's percentage of total urban population. The same method applied for the suburban poverty groups.

## RESULTS

### Utilization by Hospital Ownership

The suburbs, which have two thirds more population than the urban areas of the 100 largest cities, are home to many more acute care general hospitals than the cities they surround. Urban hospitals, however, have more staffed beds and provide a much larger volume of both inpatient and outpatient care, on average, compared to suburban hospitals, regardless of ownership type.

All hospital ownership groups experienced moderate to substantial declines in their numbers from 1996 to 2002 (Table 1). Proportionally, the greatest losses occurred among public hospitals. Public hospitals declined by 16% in cities, from 83 to 70, compared with 11% for nonprofit and for-profit urban hospitals. Suburban public hospitals declined by 27%, from 134 to 98 between 1996 and 2002 (Table 2). Suburban area nonprofit and for-profit hospitals decreased by 2 and 11%, respectively.

As the number of hospitals declined, the bed size per hospital increased over the same 6-year period. For-profit hospitals had the largest average increase in bed size in cities (14%), whereas public hospitals led in the suburbs (26%). Increases in average bed size were associated with increases in utilization. Urban for-profit hospitals consistently showed the greatest increases in several indicators, including the average number of admissions (36%), inpatient days (30%), outpatient visits (39%), and ED visits (61%) per hospital between 1996 and 2002.

With the largest average bed size, urban public hospitals had much higher utilization per facility than nonprofit and for-profit urban hospitals. Across the entire set of 100 largest cities, however, they were responsible for fewer total admissions, inpatient days, and ED visits (but not outpatient visits) in 2002 than in 1996. In contrast, for-profit hospitals, as a group, saw double-digit growth on each of these measures, and by 2002, had surpassed public hospitals in the total number

**TABLE 1 Urban hospital statistics by type of ownership**

					Percent change		
	Hospital ownership	1996	1999	2002	1996–1999	1999–2002	1996–2002
Number of hospitals	For-profit	161	148	143	–8.1	–3.4	–11.2
	Nonprofit	486	454	432	–6.6	–4.8	–11.1
	Public	83	72	70	–13.3	–2.8	–15.7
	Total	730	674	645	–7.7	–4.3	–11.6
Staffed beds							
Per hospital	For-profit	209	226	238			
	Total	33,727	33,459	34,004	–0.8	1.6	0.8
Per hospital	Nonprofit	372	381	394			
	Total	180,789	173,156	170,070	–4.2	–1.8	–5.9
Per hospital	Public	431	420	434			
	Total	35,805	30,265	30,381	–15.5	0.4	–15.1
Per hospital	Total	343	351	363			
	Total	250,321	236,880	234,455	–5.4	–1.0	–6.3
Admissions							
Per hospital	For-profit	7,496	8,969	10,208			
	Total	1,206,876	1,327,367	1,459,763	10.0	10.0	21.0
Per hospital	Nonprofit	14,930	16,602	18,419			
	Total	7,255,948	7,537,279	7,956,852	3.9	5.6	9.7
Per hospital	Public	17,321	17,861	18,613			
	Total	1,437,671	1,285,989	1,302,886	–10.6	1.3	–9.4
Per hospital	Total	13,562	15,060	16,619			
	Total	9,900,495	10,150,635	10,719,501	2.5	5.6	8.3
Inpatient days							
Per hospital	For-profit	40,972	47,471	53,407			
	Total	6,596,463	7,025,670	7,637,232	6.5	8.7	15.8
Per hospital	Nonprofit	91,617	96,441	103,603			
	Total	44,525,807	43,784,349	44,756,438	–1.7	2.2	0.5
Per hospital	Public	115,710	116,131	122,214			
	Total	9,603,959	8,361,430	8,554,979	–12.9	2.3	–10.9
Per hospital	Total	83,187	87,791	94,494			
	Total	60,726,229	59,171,449	60,948,649	–2.6	3.0	0.4
Outpatient visits							
Per hospital	For-profit	65,782	80,738	91,289			
	Total	10,590,903	11,949,217	13,054,346	12.8	9.2	23.3
Per hospital	Nonprofit	181,449	214,040	248,214			
	Total	88,184,008	97,173,938	107,228,265	10.2	10.3	21.6
Per hospital	Public	323,333	360,183	408,377			
	Total	26,836,659	25,933,162	28,586,419	–3.4	10.2	6.5
Per hospital	Total	172,071	200,380	230,805			
	Total	125,611,570	135,056,317	148,869,030	7.5	10.2	18.5
ED visits							
Per hospital	For-profit	17,077	21,980	27,507			
	Total	2,749,400	3,253,030	3,933,480	18.3	20.9	43.1
Per hospital	Nonprofit	33,957	39,851	44,865			
	Total	16,503,073	18,092,234	19,381,719	9.6	7.1	17.4
Per hospital	Public	60,176	63,166	70,167			
	Total	4,994,646	4,547,933	4,911,690	–8.9	8.0	–1.7
Per hospital	Total	33,215	38,417	43,763			
	Total	24,247,119	25,893,197	28,226,889	6.8	9.0	16.4

Source: AHA Annual Survey of Hospitals, 1996, 1999, 2002

**TABLE 2 Suburban hospital statistics by type of ownership**

					Percent change			
		Hospital ownership	1996	1999	2002	1996–1999	1999–2002	1996–2002
Number of hospitals	For-profit		164	146	146	−11.0	0.0	−11.0
	Nonprofit		608	603	595	−0.8	−1.3	−2.1
	Public		134	111	98	−17.2	−11.7	−26.9
	Total		906	860	839	−5.1	−2.4	−7.4
Staffed beds								
Per hospital	For-profit		148	145	145			
Total			24,301	21,152	21,219	−13.0	0.3	−12.7
Per hospital	Nonprofit		204	203	201			
Total			124,190	122,663	119,746	−1.2	−2.4	−3.6
Per hospital	Public		135	149	171			
Total			18,156	16,513	16,738	−9.0	1.4	−7.8
Per hospital	Total		184	186	188			
Total			166,647	160,328	157,703	−3.8	−1.6	−5.4
Admissions								
Per hospital	For-profit		5,412	5,861	6,680			
Total			887,489	855,748	975,213	−3.6	14.0	9.9
Per hospital	Nonprofit		8,228	9,077	9,732			
Total			5,002,332	5,473,212	5,790,584	9.4	5.8	15.8
Per hospital	Public		5,149	6,048	7,468			
Total			689,902	671,352	731,815	−2.7	9.0	6.1
Per hospital	Total		7,262	8,140	8,936			
Total			6,579,723	7,000,312	7,497,612	6.4	7.1	14.0
Inpatient days								
Per hospital	For-profit		26,587	28,229	31,886			
Total			4,360,344	4,121,392	4,655,293	−5.5	13.0	6.8
Per hospital	Nonprofit		45,541	47,160	48,757			
Total			27,689,204	28,437,474	29,010,544	2.7	2.0	4.8
Per hospital	Public		29,518	36,015	43,066			
Total			3,955,393	3,997,678	4,220,449	1.1	5.6	6.7
Per hospital	Total		39,741	42,508	45,156			
Total			36,004,941	36,556,544	37,886,286	1.5	3.6	5.2
Outpatient visits								
Per hospital	For-profit		48,672	58,376	69,625			
Total			7,982,232	8,522,945	10,165,240	6.8	19.3	27.3
Per hospital	Nonprofit		117,154	136,517	149,959			
Total			71,229,639	82,319,984	89,225,596	15.6	8.4	25.3
Per hospital	Public		83,167	109,429	137,717			
Total			11,144,417	12,146,647	13,496,252	9.0	11.1	21.1
Per hospital	Total		99,731	119,755	134,550			
Total			90,356,288	102,989,576	112,887,088	14.0	9.6	24.9
ED visits								
Per hospital	For-profit		16,433	19,524	22,624			
Total			2,695,092	2,850,473	3,303,051	5.8	15.9	22.6
Per hospital	Nonprofit		25,221	28,197	31,841			
Total			15,334,310	17,002,859	18,945,393	10.9	11.4	23.5
Per hospital	Public		19,338	22,367	27,502			
Total			2,591,272	2,482,717	2,695,148	−4.2	8.6	4.0
Per hospital	Total		22,760	25,972	29,730			
Total			20,620,674	22,336,049	24,943,592	8.3	11.7	21.0

Source: AHA Annual Survey of Hospitals, 1996, 1999, 2002

of staffed beds (34,000 vs 30,400) and admissions (1.5 million vs 1.3 million) in the largest urban areas.

### **Medicaid Utilization and Hospital Ownership**

In cities, public hospitals maintained the highest average rate of Medicaid discharges as a percentage of total admissions in 2002 (31.1%) compared to nonprofit hospitals (18%) and for-profit hospitals (19.8%), but the differences among the groups have narrowed since 1996. For-profit and nonprofit hospitals increased their share of Medicaid discharges from 1996 to 2002, whereas the reverse was true for public hospitals (Table 3). Total Medicaid discharges rose nearly 39% among for-profit hospitals while declining more than 20% among urban public hospitals. Medicaid discharges rose about 17% among nonprofit hospitals over the same 6-year period.

Medicaid's proportion of total admissions per hospital varied much less by ownership type in the suburbs compared to urban areas, ranging from an average of 13.3% for nonprofit hospitals to 18.9% for public hospitals in 2002. In contrast to urban hospitals, the Medicaid proportion of total discharges per hospital and the total number of Medicaid discharges rose among suburban hospitals for all three ownership types between 1996 and 2002. Suburban for-profit hospitals were responsible for a larger total number of Medicaid discharges than public hospitals for each of the three study years.

In both cities and suburbs, for-profit hospitals had the shortest Medicaid ALOS and public hospitals had the longest. From 1996 to 2002, city and suburban public hospitals both saw similar increases—between 11 and 12%—in their Medicaid ALOS to 7.5 days for city public hospitals, and to 7.7 days among suburban public hospitals. In contrast, the ALOS for Medicaid patients served in nonprofit hospitals declined by 9% to 6.2 days in cities and declined by 8.5% to 5.7 days in suburban areas. For-profit hospitals in cities and suburbs saw modest increases (about 3 and 8%, respectively) in their Medicaid ALOS to 5 days in 2002.

### **Hospital Utilization and Capacity by Poverty Level in Cities and Suburbs**

The cities and suburban areas, each grouped by low, medium, and high poverty rates, as described in the Methods section, differ on a number of demographic characteristics. On average, high poverty cities and high poverty suburbs are relatively larger, have the lowest proportions of white residents and those without a high school education, have the highest proportion of black residents, and have the highest percentage of population that receives public assistance and is unemployed (Table 4). Violent crime rates are also highest in high poverty cities and suburbs, as are low birth weight rates, relative to their respective low and medium poverty groups. Cities, overall, are more racially and ethnically diverse than their suburbs, but vary less by poverty level on the percentage of Hispanic and foreign-born residents compared with the suburbs.

We found that the proportion of hospital utilization and resources in high poverty cities was modestly higher than their proportion of urban population. High poverty cities had slightly higher proportions of beds, admissions, inpatient days, and ED and outpatient visits relative to their proportion of the total urban population (Figure 1).

By contrast, high poverty suburbs showed dramatically lower levels of utilization relative to their share of the suburban population. These suburban



TABLE 3 Medicaid discharges and ALOS for urban and suburban hospitals

	Hospital ownership	1996	1999	2002	Percent change		
					1996–1999	1999–2002	1996–2002
Urban hospitals							
Medicaid discharges							
Percent of total admissions	For-profit	17.3	15.9	19.8			
No. of discharges		208,574	211,548	289,347	1.4	36.8	38.7
Percent of total admissions	Nonprofit	16.9	14.2	18.0			
No. of discharges		1,227,919	1,073,857	1,431,585	-12.5	33.3	16.6
Percent of total admissions	Public	35.8	31.4	31.1			
No. of discharges		515,129	403,748	405,326	-21.6	0.4	-21.3
Percent of total admissions	Total	19.2	16.5	19.8			
No. of discharges		1,896,137	1,669,811	2,124,729	-11.9	27.2	12.1
Medicaid ALOS							
	For-profit	4.9	5.1	5.0	4.4	-1.1	3.2
	Nonprofit	6.8	6.8	6.2	-0.2	-8.9	-9.1
	Public	6.8	7.4	7.5	8.6	2.2	11.1
	Total	6.6	6.7	6.3	1.7	-6.3	-4.6
Suburban hospitals							
Medicaid discharges							
Percent of total admissions	For-profit	17.2	14.4	17.9			
No. of discharges		152,703	123,054	174,505	-19.4	41.8	14.3
Percent of total admissions	Nonprofit	12.5	10.6	13.3			
No. of discharges		626,999	582,664	770,523	-7.1	32.2	22.9
Percent of total admissions	Public	17.8	22.1	18.9			
No. of discharges		122,463	148,502	137,976	21.3	-7.1	12.7
Percent of total admissions	Total	14.2	12.8	14.8			
No. of discharges		931,123	893,282	1,106,106	-4.1	23.8	18.8
Medicaid ALOS							
	For-profit	4.6	5.0	5.0	8.5	-0.2	8.3
	Nonprofit	6.3	6.3	5.7	0.8	-9.2	-8.5
	Public	6.9	8.3	7.7	19.9	-6.8	11.8
	Total	6.1	6.4	5.9	5.8	-8.7	-3.4

Source: AHA Annual Survey of Hospitals, 1996, 1999, 2002



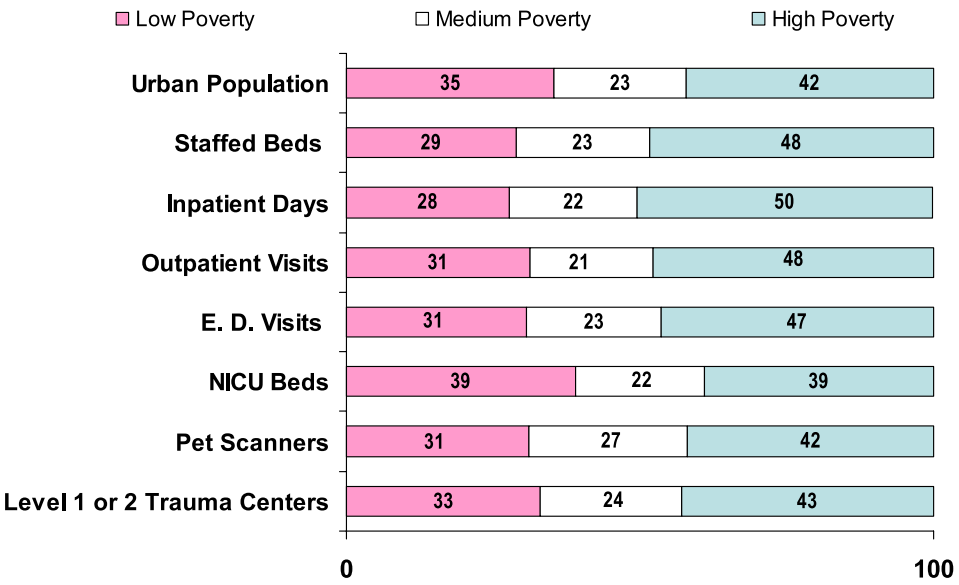
TABLE 4 Characteristics of 100 largest cities and their suburbs by poverty rate levels,<sup>a</sup> 2000

	Cities by poverty level				Suburbs by poverty level			
	Total	Low	Medium	High	Total	Low	Medium	High
Total population <sup>b</sup>	56,590,581	19,956,047	12,812,500	23,822,034	94,758,109	25,094,993	27,888,383	41,774,733
Average population size	690,129	623,626	557,065	882,298	1,184,461	815,347	1,237,728	1,562,885
Percent of population 65 and older	11.2	10.5	10.9	12.2	11.2	11.1	11.7	10.7
Percent of population non-Hispanic white	50.7	60.9	52.6	37.0	73.8	84.1	75.3	58.0
Percent of population non-Hispanic black	25.4	15.7	18.3	42.9	8.2	6.0	8.3	11.1
Percent of population Hispanic	16.3	13.0	21.9	15.3	12.5	5.3	9.4	26.4
Percent of population foreign-born	13.3	13.4	14.2	12.6	9.4	7.4	8.4	13.6
Percent of population on public assistance	5.1	3.4	5.1	7.2	2.7	1.8	2.5	4.1
Percent of population 25 and older with no high school diploma	21.6	16.4	22.0	27.5	16.8	12.0	15.5	25.1
Unemployment rate (%)	7.6	5.5	7.3	10.4	4.9	3.6	4.6	7.1
Violent crime rate (per 100,000 pop.)	990.3	792.2	893.4	1307.7	323.0	216.9	337.5	448.4
Low birth weight rate (percent of live births)	8.9	7.8	8.2	10.6	7.1	6.6	7.1	7.6

Source: Demographic statistics tabulated from 2000 Census Bureau data; violent crime rates tabulated from 2000 FBI crime data; low birth weight rates tabulated from the 2000 Natality Data Set provided by the National Center for Health Statistics.

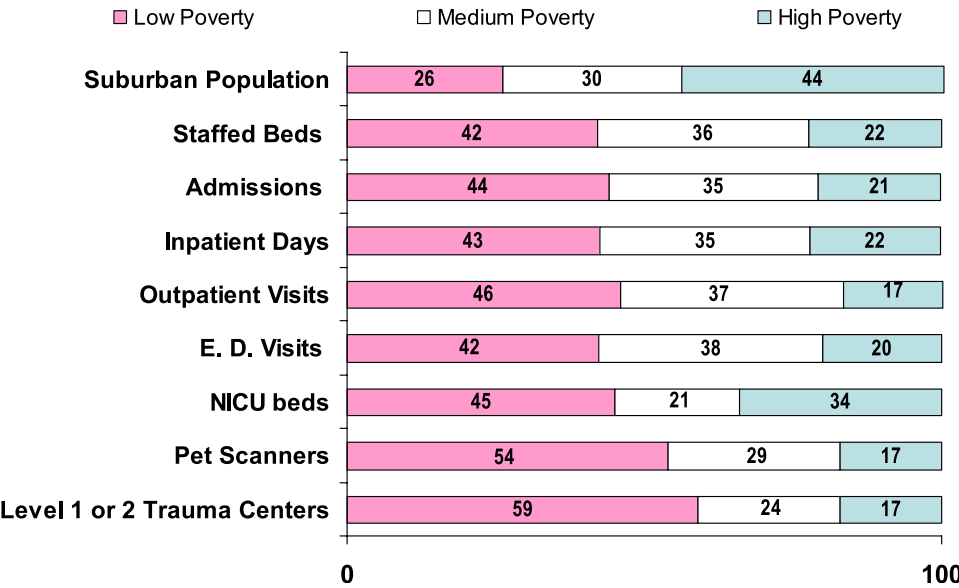
<sup>a</sup>Categories for percentage of population living below federal poverty level are cities: low <15%, medium 15–20%, and high >20%; suburbs: low <7%, medium 7–10%, and high >10%

<sup>b</sup>Suburban numbers exclude the population of suburban areas that were not represented by in the hospital data sets.



**FIGURE 1.** One hundred largest cities by poverty level: Distribution of 2000 population compared with distribution of hospital beds, utilization and specialty care, 2002 (percentages shown).

communities, which accounted for the largest proportion of the suburban population—44% in 2000—represented about one fifth of all suburban hospital beds, ED admissions, and inpatient days in 2002, and only 17% of the outpatient visits (Figure 2). Low poverty suburbs, with just over one quarter (26%) of the total



**FIGURE 2.** Suburbs of 100 largest cities by poverty level: Distribution of 2000 population compared with distribution of hospital beds, utilization and specialty care, 2002 (percentages shown).

suburban population, accounted for 42% of suburban hospital beds and more than 40% of each of the other utilization measures.

We selected three high-cost hospital services to examine by community poverty level: level 1 or 2 trauma care, PET scanners, and NICU beds. In cities, the overall distribution and availability of these services across the three poverty groups generally matched the distribution of the population across these groupings. For example, high poverty cities, with 42% of the total urban population in 2000, represented 43% of the urban level 1 and 2 trauma centers, 42% of the urban PET scanners, and 39% of the urban NICU beds in 2002.

In suburban areas, distribution of these services by level of poverty was not proportionate to the population distribution by poverty level. The low poverty suburbs, with 26% of the total suburban population, accounted for 59% of these trauma centers, 54% of the PET scanners, and 45% of the NICU beds. From 1996 to 2002, the number of PET scanners reported in hospitals located in low poverty suburbs increased from 3 to 60 (data not shown). As with service utilization, high poverty suburbs were significantly underrepresented by these capacity measures. With 44% of total suburban population, they had only 17% of suburban trauma centers and PET scanners and 34% of suburban NICU beds in 2002.

## DISCUSSION

The results of our analysis of hospital data for urban and suburban areas of the 100 largest cities between 1996 and 2002 highlight two key themes. The first is that while public hospitals remain as the major safety net providers in the communities they serve, hospital inpatient care overall and for Medicaid patients in particular appears to be shifting from the public to the private sector. These trends raise questions about the long-term effects of a hospital safety net increasingly comprised of nonprofit and for-profit institutions.

The second theme relates to the apparent disparities in the relative availability of hospital resources between low poverty and high poverty suburban areas. In contrast, for cities, there was only modest or little difference between the percentage distribution of utilization or availability of select specialty care services across low, medium, and high urban poverty areas, and the percentage distribution of population across these three groups. The findings have implications for poor residents in high poverty suburban areas, and also for urban safety net hospitals and the role that they may play in caring for poor suburban residents in surrounding communities. The appropriateness of the levels of hospital resources concentrated in low poverty suburban areas also comes into question.

### City-Suburban Differences by Ownership

The number of general acute care hospitals and staffed beds declined between 1996 and 2002, with public hospitals showing the largest percentage decreases in both cities (16%) and suburbs (27%). These trends represent an acceleration in closings, mergers, or conversions of public hospitals compared with the previous 16-year period, between 1980 and 1996, noted earlier. The remaining urban public hospitals continued to be relatively large facilities, as measured by their bed size, but their presence across the urban landscape is diminishing. By 2002, for-profit hospitals had eclipsed public hospitals in the volume of total and Medicaid admissions in the largest cities. Whereas urban public hospitals still provided a

larger share of ED visits compared with urban for-profit hospitals, they were the only group to see a decline in ED visits between 1996 and 2002.

These trends suggest a diminishing role for public hospitals in the provision of inpatient care and a shift toward the private sector. This change has been documented in New York City and Miami, for example, where the public hospital systems are facing increasing competition from private hospitals for Medicaid enrollees.<sup>14,15</sup> However, research on urban and suburban hospital care found that private hospitals maintained a very consistent proportion of gross patient revenues attributed to Medicaid and self-pay (i.e., a proxy for uninsured) patients during the 1990s, and that changes within one category were offset by relatively similar amounts in the other.<sup>16</sup> This consistency suggests that private hospitals, in general, may seek to stabilize a ceiling on the proportion of revenues dedicated to low income populations to maintain their operating margins. To do so may require decreasing charity care or increasing revenues through collections, or seeking Medicaid patients who are more likely to generate positive income (e.g., women giving birth). However, the threat of lawsuits and congressional hearings are putting more pressure on nonprofit hospitals to show they have provided a significant community benefit worthy of their tax-exempt status, particularly regarding care for the uninsured and other vulnerable populations.<sup>17,18</sup>

In suburbs, for-profit hospitals continued to have a larger share of total and Medicaid inpatient volume compared to public hospitals. But unlike urban areas, both inpatient and outpatient volume increased across suburban public hospitals. In addition, average bed size for remaining public hospitals increased considerably, suggesting that relatively smaller facilities closed or converted ownership, or merged with other hospitals. It is also possible that new beds were added to remaining hospitals as a result of hospital closings. One question, and an area for future research, is whether the larger size of remaining suburban public hospitals, combined with their increase in utilization across suburban areas, suggest that their numbers and staffed beds will stabilize or continue to decline from continued financial pressures.

We also found that public hospitals in urban and suburban areas had both the longest Medicaid ALOS and the steepest rise in Medicaid ALOS between 1996 and 2002. These findings may indicate that, on average, public hospitals treat more seriously ill Medicaid patients than for-profit or nonprofit hospitals, or that public hospitals are performing fewer services such as deliveries, which are associated with relatively shorter hospital stays. The results may also suggest that public hospitals are less efficient in providing care or in their discharge planning, which could also be related to patient circumstances beyond the hospitals' control. Whether the longer ALOS is related to inefficiencies or sicker patients or both, the financial implications are ominous and worthy of additional study. Without adequate revenues to cover the costs of care and to maintain infrastructure, many public hospitals will continue to face an uphill battle for survival.

### **Hospitals in Low, Medium, and High Poverty Urban and Suburban Areas**

Our review of hospital capacity and utilization by community poverty levels indicates that high poverty cities accounted for a slightly larger proportion of hospital use relative to their proportion of the total urban population, whereas the availability of specialty services such as trauma care, NICU beds, and PET scanners across low, medium, and high poverty cities was generally in line with the

population distribution across these groups. Among suburban areas, however, we found that high poverty communities represented the greatest proportion of suburban population in 2000 but had the smallest proportion of hospital use and specialty care capacity, as indicated by the proportion of PET scanners, trauma care centers, and NICU beds. The opposite was true of low poverty suburbs, which represented the smallest proportion of total suburban population, but had the largest proportions of suburban hospital use and specialty care capacity. This lopsided distribution of hospital resources in favor of low poverty suburbs supports other research documenting that hospitals have targeted expansion of specialty care services to high-income markets.<sup>6,19</sup> The population characteristics of low poverty suburban areas suggest that their residents are, on average, the most affluent in metropolitan America, and likely are the best insured.

By the same token, hospital systems may be reluctant to expand into high poverty suburbs. Although we do not have data on uninsured rates for these areas, low income is highly associated with insurance status.<sup>20</sup> We also noted earlier that the high poverty suburban areas averaged the largest percentages of Hispanic and foreign-born populations. Surveys have documented these groups as having among the highest uninsured rates in the country.<sup>21</sup> A lack of health coverage may be a contributing factor in the relatively small proportion of hospital resources available in high poverty suburbs.

For hospitals that do serve poor areas, the trends are troubling. We found that between 1996 and 2002, high poverty areas had the greatest decline in the number of suburban hospitals (data not shown). Such losses may further exacerbate access problems, particularly for those with limited or no insurance and limited transportation options.<sup>6</sup> These findings suggest other areas of inquiry of metropolitan safety net issues by raising questions about whether residents in high poverty suburban areas, especially those who are poor or uninsured, will become increasingly dependent on nearby city public hospitals. This contention has already surfaced in Texas, where indigent or uninsured patients residing in surrounding suburban counties of five urban county hospital districts accounted for 16% of the \$1.2 billion in uncompensated care provided by the public hospitals in these districts in 2002.<sup>22</sup>

The continued growth in the uninsured population in this country, which now exceeds 46 million, is one of the most critical issues facing safety net hospitals today, regardless of ownership status.<sup>23</sup> The responsibilities of each community to care for its uninsured and other vulnerable populations fall on local hospitals and other safety net providers. In the absence of state, regional, or national reforms to significantly expand insurance coverage, hospitals will continue to search for ways to limit their financial exposure from caring for uninsured patients, particularly as the hospital industry becomes even more competitive in a global economy.<sup>24</sup>

A limitation of this study is that we did not conduct a multivariate analysis. Our aggregate analyses focus on poverty without considering other potentially important factors that may influence hospital distribution, or supply and demand, such as regional dynamics, local economics, political jurisdictional considerations, uninsured rates and rates of disability.<sup>25</sup> At the same time, the results of our analysis may offer direction for future research that takes these factors into account. The results of this study also do not allow us to assess whether a group of cities or suburbs provides too much or too little hospital care, nor do they address critical concerns about the distribution of hospital services within individual cities or suburban areas.

## CONCLUSIONS

What do these results by ownership and poverty say about the future of hospital care in urban and suburban areas? The continued losses of public hospitals in both cities and suburbs, at the very least, inject uncertainty about a changing hospital safety net that increasingly involves the private sector. The fallout from this transition in cities may differ significantly from the suburbs. In large central cities, the size of public and other primary safety net institutions, their constituency, their presence as an employer, and the political issues surrounding their status suggest that communities are likely to demand a careful assessment of impact, as well as a viable alternative safety net plan.<sup>4</sup> Suburban areas with growing numbers of poor, or those losing their public or primary safety net hospitals, may be less likely to have the strong constituencies found in central cities. As a result, there may be a less vocal and concerted effort to assure that viable options are available, with the consequences falling on the most vulnerable. Ultimately, more regional cooperation may be required to ensure adequate financing and access to hospital care for the poor and uninsured in large metropolitan areas.

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